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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/645,665	08/22/2003	Raj Dhindsa	2328-062	8414
22429	7590	09/26/2006	EXAMINER	
LOWE HAUPTMAN BERNER, LLP			LE, TUNG X	
1700 DIAGONAL ROAD				
SUITE 300			ART UNIT	
ALEXANDRIA, VA 22314			2821	
			PAPER NUMBER	

DATE MAILED: 09/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/645,665		DHINDSA ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Tung X. Le		2821	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 August 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 15-51 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 42-51 is/are allowed.
- 6) ☒ Claim(s) 15-33, 35-37 and 39-41 is/are rejected.
- 7) ☒ Claim(s) 34, 38 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11/11/2004</u> . <u>01/13/2006</u>                            | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This is a response to the amendment received on August 03, 2006. In virtue of the amendment:

- Claims 3 and 6 are currently cancelled.
- Claims 1-2, 4-5, and 7-14 are not elected as regarding to the record of the restriction completed on July 03, 2006 by Examiner, Maureen Arancibia.
- Claims 15-51 are elected to be class 315/111.21.
- Claims 62-63 are new added and they are not elected for belonging to the group of claims 1-2, 4-5, and 7-14.
- Thus, claims 1-2, 4-5, 7-14, and 62-63 have been withdrawn; and claims 15-51 are currently presented in the instant application.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 15-33, 35-37, and 39-41 are rejected under 35 U.S.C. 102(b) as being anticipated by Shan et al. (U.S. 2001/0009139 A1).

With respect to claim 15, Shan discloses in figures 2-5 an apparatus for processing a workpiece with a plasma (230) (paragraph [0025]) comprising a vacuum chamber (200) for processing the workpiece with the plasma (paragraph [0023]), and means for exciting the plasma with electric energy at several frequencies (paragraphs

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[0027-0029] indicated several frequencies [f1-f2] of powers [240 and 242]) such that the excitation of the plasma by the several frequencies simultaneously causes several different phenomena to occur in the plasma (paragraph [0009]), wherein the phenomena affect plasma ion energy, plasma ion density and plasma chemistry of the plasma incident on the workpiece (paragraphs [0006 and 0011]).

With respect to claim 16, Shan discloses in figure 2 a vacuum plasma processor comprising a vacuum chamber (200) including an electrode (215), the chamber being associated with a reactance (241), the electrode and the reactance being arranged for coupling plasma excitation fields to gas in the chamber (figure 2), the chamber being arranged for carrying a workpiece while the plasma excitation fields are coupled to the plasma (paragraphs [0023-0025]), and a plasma excitation source arrangement (239) for enabling the electrode (215) and reactance (241 and 243) to couple the electric energy at several frequencies to the plasma (paragraphs [0027-0029] indicated several frequencies [f1-f2] of powers [240 and 242]).

With respect to claim 17, Shan discloses that the plasma excitation source arrangement is arranged for causing the several frequencies to be simultaneously applied to the plasma (paragraphs [0027-0029] indicated several frequencies [f1-f2] of powers [240 and 242]).

With respect to claim 18, Shan discloses that the electrode for carrying the workpiece includes a first electrode (404) in the chamber and the reactance includes a second electrode (406) in the chamber (figure 4).

With respect to claim 19, Shan discloses in figure 4 that the plasma excitation source arrangement (239) is arranged for applying a plurality of the frequencies (f1-f2) to the first electrode (404) and at least one of the frequencies to the second electrode (406).

With respect to claim 20, Shan discloses in figure 4 that the plasma excitation source arrangement (239) is arranged for applying several of the frequencies (f1-f2) to the electrode (404 and 406).

With respect to claim 21, Shan discloses that the first and second electrodes (404 and 406) and the source arrangement (239) are arranged for causing the second electrode to be at a reference potential and for simultaneously causing the source arrangement to apply the several frequencies to the first electrode (paragraph [0033]).

With respect to claim 22, Shan discloses in figure 2 that the plasma excitation source arrangement (239) includes at least one variable frequency RF source (240) (paragraph [0011]).

With respect to claim 23, Shan discloses in figure 2 that the plasma excitation source arrangement (239) includes circuitry (250 and 239) for (a) providing an impedance match (241 and 243) between sources (240 and 242) of the frequencies and the plasma (230) and (b) decoupling the frequencies (f1-f2) associated with the different sources (240 and 242) from each of the other sources (figures 2 and 4).

With respect to claim 24, Shan discloses in figure 2 that the excitation source arrangement (239) is arranged and the frequencies (f1-f2) have values for causing several different phenomena to occur simultaneously in the plasma (paragraph [0009]).

With respect to claim 25, Shan discloses a vacuum plasma processor for a workpiece comprising a vacuum chamber including first and second electrodes for supplying plasma excitation fields to a region of the chamber adapted to be responsive to gas adapted to be converted into a plasma for processing the workpiece, the chamber being arranged for carrying the workpiece while the plasma exciting fields are supplied to the region, a plasma excitation source arrangement for deriving electric energy at several frequencies, the plasma excitation source arrangement including circuitry for selectively enabling coupling of the several frequencies to at least one of the first and second electrodes for enabling plasma exciting electric fields at the several frequencies to be coupled to the plasma.

With respect to claim 26, Shan discloses that in figure 4 the circuitry (239 and 250) is arranged for coupling a plurality of the frequencies ( $f_1$ - $f_2$ ) to the first electrode (404) and for coupling at least one of the frequencies to the second electrode (406).

With respect to claim 27, Shan discloses in figure 2 that the circuitry (250 and 239) is arranged for (a) providing an impedance match (241 and 243) between sources (240 and 242) of the frequencies and the plasma (230) and (b) decoupling the frequencies ( $f_1$ - $f_2$ ) associated with the different sources (240 and 242) from each of the other sources (figures 2 and 4).

With respect to claim 28, Shan discloses in figure 2 that the plasma excitation source arrangement (239) includes several different frequency sources (240 and 242).

With respect to claim 29, Shan discloses in figure 2 that at least one of the sources (240) has a variable frequency (paragraph [0011]).

With respect to claim 30, Shan discloses in figure 2 that at least one of the sources (240) has a fixed frequency (paragraph [0011]).

With respect to claim 31, Shan discloses that various combinations of the several frequencies affect (a) the density of the plasma (paragraph [0011]) (b) the energy of ions in the plasma (paragraph [0011]), and (c) the chemistry of the plasma (paragraph [0006]).

With respect to claim 32, Shan discloses that at least one of the sources has a variable output power (paragraph [0027] indicates that the variable frequencies are related to the variable power sources).

With respect to claim 33, Shan discloses in figures 2 and 4 that the circuitry (239 and 250) and the chamber (200) are arranged for preventing substantial current to flow at least one of the plurality of frequencies ( $f_1$ - $f_2$ ) to the second electrode (406).

With respect to claim 35, Shan discloses in figure 2 and 4 that the circuit (239 and 250) is arranged for connecting the second electrode (406) to a reference potential (242) and for supplying the several frequencies ( $f_1$ - $f_2$ ) to the first electrode (404).

With respect to claim 36, Shan discloses in figures 2 and 4 that the circuitry (239 and 250) is arranged for supplying the same frequency to the first and second electrode (paragraph [0011]).

With respect to claim 37, Shan discloses in figures 2 and 4 that the plasma source arrangement (239) is arranged for simultaneously coupling the several frequencies ( $f_1$ - $f_2$ ) with the electrodes (404 and 406).



With respect to claim 39, Shan discloses in figures 2 and 4 that the controller (250) is arranged for selectively connecting the first electrode (404) to be responsive to each of the several frequencies (f1-f2) during the first time period (paragraph [0043]).

With respect to claim 40, Shan discloses in figures 2 and 4 that the plasma excitation source arrangement (239) is arranged for applying several of the frequencies (f1-f2) to the first electrode (404).

With respect to claim 41, Shan discloses that the first and second electrodes (404 and 406) and the source arrangement (239) are arranged for causing the second electrode to be at a reference potential and for simultaneously causing the source arrangement to apply the several frequencies to the first electrode (paragraph [0033]).

***Allowable Subject Matter***

4. Claims 42-51 are allowed.
5. Claims 34 and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
6. The following is a statement of reasons for the indication of allowable subject matter:

Prior art of record fails to disclose or fairly suggest the following limitations:

- A vacuum plasma processor for a workpiece comprising a filter arrangement of the circuitry, the filter arrangement being connected to the second electrode for preventing the substantial flow of current at at least one of the plurality of frequencies between the second electrode and the reference electrode, in



combination with the remaining claimed limitations as claimed in dependent claim 34.

- A vacuum plasma processor for a workpiece comprising a reference potential during a first workpiece processing time period and for selectively supplying the same frequency to the first and second electrodes during a second workpiece time period, in combination with the remaining claimed limitations as claimed in dependent claim 38.
- A vacuum plasma processor for processing a workpiece comprising the electrode arrangement including first and second electrodes respectively on opposite first and second sides of the region and a third electrode on the first side of the region, the third electrode being peripheral to and electrically insulated from the first electrode, a plasma excitation source arrangement for deriving electric energy at plural frequencies, the plasma excitation source arrangement being arranged for selectively coupling energy at the plural frequencies to the first, second and third electrodes for causing current at at least one of the plural frequencies to flow in the third electrode without current at all of the frequencies flowing in the third electrode, in combination with the remaining claimed limitations as claimed in claim 42 (claims 43-51 are allowed for depending on claim 42).

#### ***Citation of Relevant Prior Art***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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McChesney et al. (U.S. 6,727,655 B2) discloses a method and apparatus to monitor electrical states at a workpiece in a semiconductor processing chamber.

Ogawa et al. (U.S. 6,727,654 B2) discloses a plasma processing apparatus.

Yamazaki (U.S. 6,350,701 B1) discloses an etching system.

Barnes et al. (U.S. 5,982,099) discloses a method of and apparatus for igniting a plasma in an RF plasma processor.

Lenz et al. (U.S. 5,534,751) discloses a plasma etching apparatus utilizing plasma confinement.

Howard (U.S. 2005/0022933 A1) discloses a multi-frequency plasma reactor and method of etching.

### ***Inquiry***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung X. Le whose telephone number is 571-272-6010.

The examiner can normally be reached on 8:30 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Callahan can be reached on 571-272-1740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Examiner  
Tung Le  
AU 2821

September 13, 2006



TUYET VO  
PRIMARY EXAMINER